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THE PRONG-HORN

BY M. P. SKINNER

[Plates 6-9]

The prong-horn is found only in North America, where it is one of the most characteristic animals. It is peculiar in that the horn sheath is shed every year, leaving the core, which is an integral part of the skull, in place; in that the horns have a prong, hence the name, prong-horn; in that the coarse hair is of very peculiar form and character; and in that all the hair of the rump, surrounding a musk gland, can be erected. It has wonderful eyesight; and is capable of great speed.

Family ANTILOCAPRIDAE. Prong-horn Antelopes

Closely allied to the Bovidæ, but the horns deciduous and branched (Flower and Lydekker).

Genus *Antilocapra* Ord

Antilocapra ORD, Journal de Physique, vol. 87, p. 149. 1818.

Type of genus.—*Antilope americana* Ord, 1815.

Dentition of genus. I $\frac{0-0}{3-3}$ C $\frac{0-0}{1-1}$ P $\frac{3-3}{3-3}$ M $\frac{3-3}{3-3}$ 32.

Characters of genus.—Bony horn cores unbranched, forming vertical, blade-like projections immediately above the orbits; horns compressed, about 250 mm. in length, in a straight line, or 400 mm. following the curves, having a gentle backward curvature, the short branch or prong arising about the middle of its height. When the horn is about to be cast off, it becomes loosened and a new one covered with long hairs, which soon disappear, is formed upon the bony core beneath it. The ears are long and pointed. Tail short and pointed, densely coated with coarse hair, except on the underside where the hairs are extremely short. The neck has a thick mane of long chestnut colored hair. Accessory hoofs are wanting. The lachrymal sinuses of the true antelopes are undeveloped; as also are the "inguinal pores," or groin sacks found in true antelopes.¹

SUBSPECIES

Antilocapra americana americana (Ord), 1815. Described from the "plains and highlands of the Missouri," and including most of the range of the Prong-horn.

Antilocapra americana mexicana Merriam, 1901. Mexican Prong-horn Antelope. Described from Sierra en Media, State of Chihuahua, Mexico. Sonoran and Transition zones of northern Mexico, extending north into the United States, along the Mexican border.

¹ Mearns, Bull. 56, U. S. Nat. Mus., pp. 220-221, 1907.

Antilocapra americana peninsularis Nelson, 1912. Described from forty-five miles south of Calmalli, Lower California. This animal is probably confined to the peninsula of Lower California, Mexico.

Although this animal is known all through the west, and throughout American literature, as the antelope, we have no true antelopes in this country,² for all the existing animals of the group, including the gazelles, are Old World species and mainly of African habitat. This is the only animal in the United States that approaches them at all in form and habits. It is the sole representative of its genus and family, for the peculiarities of the horns and their growth are deemed sufficient to justify a separate family, intermediate between the giraffes and the Bovidæ. It is known generally as American Antelope, Prong-horn, or Prong-buck, and was called Cabree and Cabrit by the Canadian French trappers.

A full-grown prong-horn is smaller than most adult American deer. The bucks are slightly larger than the does. The robust and somewhat chunky body, which supports a short, thick-set neck carrying erect a large head, is quite different in form from that of a deer. The tail is very short, and the limbs are slim and rather short.

The coloring is made up of white and fawn, with black and brown markings about the head and neck. The white occupies all of the under surface of the body, extending down the inner side of the limbs and also well up on the sides of the body, where a rectangular area between the shoulder and hip is formed. The rump, with the exception of a narrow fawn strip usually connecting the upper surface of the tail with the colored area of the back, is white; and when erected in fright or excitement, it catches the sun and gleams out brightly. The lips and chin are white; in the mouth parts, the mucous membrane and naked areas are coal black. White also are areas on the cheeks, throat, and inner surface of the ears, besides which the neck, underneath, is beautifully marked with a white crescent above, and a white shield below. Fawn occupies the back and most of the neck, extending down the outer sides of the limbs until it encircles them low down, and also extending backward in a narrow line dividing the rump and terminating on the basal part of the tail. This fawn color becomes more tawny on the neck, and the elongated hairs of the short, erect mane are russet, tipped usually with black in varying amount. The head, which varies from creamy white on the sides to wood brown above, is marked with

² The Rocky Mountain goat is the nearest approach to the Old World "antelopes" among the American Bovidæ.

brownish black in the male. There are white areas around the horns and at the base of the ears. The blackish markings are much more noticeable on the old males than on the does and younger animals. In typical *americana* the black sometimes occupies the whole face below a line connecting the horns, but usually this area is T-shaped with the horizontal line between the horns and the vertical line down the nose. In *mexicana* and *peninsularis*, the blackish area becomes dark brown, and is more restricted. In all forms, the eyelashes are jet black. There is a black edge to the ear, and a black line, in the male, outlines the edge of the lower jaw, starting just below the ear and extending down for several inches, less on younger bucks than on older animals. This latter is a sex mark, distinguishing the male at all ages, and even appearing on some fetal specimens. The tail is white, or nearly so. The small pointed hoofs are double and black; the two small rudimentary hoofs, usually seen on ruminant animals on the rear legs above the genuine hoofs, are absent.³

The amounts of black, brown, and white differ in this animal according to season, sex, and age.

Young prong-horns, until a month or two old, are paler than their parents, and the rump patch is tinged with pale russet and is not distinct—but it is interesting to observe that the rump can be erected by a kid but a few hours old—indeed all of the pattern is obscure, the white areas are stained with dull buff, and the blackish parts are only faintly indicated. Little curls of dusky hair mark the location of the coming horns of the male.

A full-grown prong-horn is about four and a half feet long and between three and four feet high at the withers. A few weights are recorded by Mearns: an adult male weighed 112 pounds as killed, after bleeding; an adult female weighed 109 pounds as killed, after bleeding; three adult males weighed 64, 56, and 67 pounds, respectively, after removal of head, feet, skin, and viscera.

The ear stands erect when the prong-horn is at ease, giving the animal an alert and striking appearance. When he becomes excited, the ears, which are wonderfully acute, are projected forward to catch the slightest sound. They are five inches high, three inches broad at the widest place, terminate in a point, and are covered inside and out with hair.

The eyes are black, lustrous, very expressive, and so large that taxidermists find them to exceed those of the horse and ox in size, and to be very nearly equal to those of the elephant.

³ Adapted from Mearns, Bull. U. S. Nat. Mus., No. 56, pp. 221-222, 1907.

In summer the hair of the prong-horn is smooth and flexible, but as winter approaches it lengthens; each hair becomes thick, the interior whitens and grows spongy, and it loses flexibility, at last becoming brittle, so that its point is easily rubbed off. It also loses its elasticity, so that when once bent it will not straighten again. A coat of fine, white fur is found next the skin, particularly in winter; and forms a close and warm covering for the wearer. Doctor Murie has shown that the prong-horn is peculiar among ruminants in possessing hair with markedly denticulate cells in the medulla. In the spring, usually during the latter part of March in the Yellowstone, the long hair is shed, beginning about the face, and is replaced immediately with shorter hair that has started to grow previous to the shedding.

In female prong-horns the horns are sometimes absent or abortive, occasionally quite large, but usually range from one to three inches long and are not branched; the horns of the adult female are invariably much smaller than those of the buck. The rudimentary horns may be detected on the buck at birth, but not so in the case of the doe. The prong-horn differs from the true antelopes in the deciduous nature of the horny sheaths covering the cores. It is interesting to observe that an early printed statement about the shedding of an antelope's horns was a denial by Audubon and Bachman (1851), that they could be shed at all. This in spite of the fact that hunters at Fort Union (now Buford, N. D.) reported to Audubon that the prong-horns did shed and renew their horns annually. And from that date down to the present time the controversy has cropped up at recurrent intervals, although it has been definitely known for some time that the horns are regularly shed, but that the method and details are quite different from those of other animals. Here in the Yellowstone, at least, every buck prong-horn sheds his horn sheaths every year during November and December. At that time of year, our animals are on a restricted range and it is comparatively easy to find them all. In the course of several seasons I have noted that bucks with old horns are to be seen until the early part of December, and, after that time, all the bucks are growing new horns. No complete horns are again seen until the first of the new horns have finished their growth towards the end of January.

The horn cores (which are *not* shed) are spikelike, rising over the great eye orbit and leaning outward, and are not branched. They are essentially processes of the frontal bone of the skull, consisting of simple flattened blades of the bone, and are covered by the horny sheath which has a decurved tip and a prong, the latter a short triangular

snag extending out in front of the middle. Below the prong, the sheath is much compressed laterally to the base; but above the prong, it becomes truly cylindrical.

In early November the horn sheath becomes loosened at the base, although still held in position by long hairs imbedded in its substance and still rooted in the epidermis, and is slowly pushed off by the new horn sheath and the stiff, bristle-like hairs forming beneath. The pushing-off process is very gradual and almost invariably one sheath falls before the other; only once have I ever found a pair of sheaths together and that was in a "bed" where the antelope had lain for some time. Apparently the buck never rubs, nor strikes, his horns to free them, as an elk or a deer usually does. In fact, in several instances I have seen the horns thrown off by a sudden jar: such as, a sudden frightened jump, or the breaking of a snow crust under the animal. The imbedded hairs are mostly broken short off, but a few may be pulled free from the sheath. The shed sheath is fringed at the bottom with the ends of hairs still fast in the horn material and usually the interior of the sheath is also lined with hair. The shed sheaths immediately become articles of food for coyotes, badgers, porcupines; and even the antelopes, themselves, have been seen nibbling them. Later, after the snow is gone, mice, gophers, and ground squirrels assist in the destruction. The sheaths that escape until May begin to turn red on the side nearest the ground, and to crack and splinter, especially on the side towards the sun. This disintegration proceeds very rapidly where conditions of moisture and dryness alternate, less rapidly where moisture is constant, and still more slowly where the ground remains dry. Provided that no animal has eaten them, the sheaths are completely destroyed in from one to three years, depending on conditions already spoken of, on amount of rainfall, and on amount of exposure to dry, hot winds. Naturally the hard, compact tip is the last part to disappear. Even when freshly fallen, the sheaths are inconspicuous and not often found unless specially looked for. This differs in many respects from the process where the bony antlers of deer and elk are shed. Under the same conditions, the latter antlers are almost indestructible. Furthermore, as they "weather" they bleach and become white and are very easily seen even at a long distance.

When the sheath is off, one finds on the tip of the horn core a soft, fleshy, nipple-like process, loose and hairless and fast hardening and changing to true horn. About the base of the horn core and up to

the nipple, is a thick velvety membrane, a special development and continuation of the outer skin, carrying long, bristle-like hairs with more of these hairs extending up the horn from the base of the core. This membrane and the bristly hairs gradually agglutinate into the nipple. The agglutinated material becomes true horn, the change slowly proceeding towards the base until the whole core is sheathed with horn in which the remaining unchanged bristly hairs are imbedded, even to the very tip of the prong and well up towards the main tip. At the time the old horn is shed in November, the new horn extends down from the tip from half an inch to two inches according as the sheath was prematurely shed or not. The horny sheath forms, and extends downward about two inches per month until January first, and then about fifty per cent faster until the first of March, when the horn, in normal adult bucks, is almost a foot in height, is curved back and inward, sometimes so as to be truly lyrate. The horns of both sexes are normally black, but the bucks manage to use theirs enough to keep the tip worn down so as to expose a bit of whitish horn material beneath. The prong (one is normal but occasionally an extra one appears or two appear beside the larger one) on the growing sheath starts to grow about January first, appearing as a small button just discernible through the hair still extending up more than half the length of the coming horn. The prong grows with the sheath to completion at the same time; as it grows it loses its bluntness and becomes compressed and sharp. The horns of the kids, very small and not easily seen the first summer, start active growth in February when the kid is about ten months old and gradually swell up two inches during the next two months, and may grow from the base for ten months longer to a total height of four inches. Afterwards the horn is shed and renewed as already described. The prong appears sometimes before the youngster is two years old, but is then hardly more than an indication of what it becomes later. Horns continue to grow larger each year until the animal's full growth is attained at the age of five. The fully developed horn is recurved and normally the tip inclines inward, but on a few rare occasions I have seen the tip turned forward instead of back. This variability in direction of the recurved tip is probably due to the fact that the horn core does not extend into the bend of the sheath and therefore cannot direct its growth. Neither does the prong have the benefit of any support from the core, and its tip usually turns in more or less. The core, however, is widened, or at least marked by an abrupt angle, under the prong.

Observations on the growth and replacement of the horns of the female are lacking as yet, but I believe the process to be essentially the same as with the bucks.

Horn measurements taken from "Hunting in Many Lands," Boone and Crockett Club series:

No. 12 Theodore Roosevelt, Medora, North Dakota, September, 1884, girth $6\frac{1}{2}$ inches, length 16 inches.

No. 13 A. Rogers, girth 6 inches, length $12\frac{1}{2}$ inches.

No. 14 A. Rogers, girth $6\frac{1}{4}$ inches, length $10\frac{7}{8}$ inches.

No. 13 measured from tip to tip, $6\frac{1}{8}$ inches. The greatest width inside the horns was $8\frac{5}{8}$ inches; the corresponding figures for No. 14 were $7\frac{3}{4}$ and $10\frac{1}{4}$ inches.

From the date when the prong-horn was first made known to science on the return of Lewis and Clark, down to the present day, it has been a favorite subject of literary efforts; many of which I regret to say, have been very fanciful. On September 5, 1804, Lewis and Clark "saw some goats or Antelopes, which the French call Cabres," (Sergeant Gass) near what is now Greenwood, South Dakota, and very close to the present state line between Nebraska and South Dakota.

Washington Irving's "Astoria" gives a good early description:

There are two kinds of antelopes in these regions, one nearly the size of the common deer, the other not much larger than a goat. Their color is a light gray, or rather dun, slightly spotted with white; and they have small horns like those of the deer, which they never shed. Nothing can surpass the delicate and elegant finish of their limbs, in which lightness, elasticity, and strength are wonderfully combined. All the attitudes and movements of this beautiful animal are graceful and picturesque; and it is altogether a fit subject for the fanciful uses of the poet, as the oft sung gazelle of the east.

Their habits are shy and capricious; they keep on the open plains, are quick to take alarm, and bound away with a fleetness that defies pursuit. When thus skimming across a prairie in the autumn, their light gray or dun colour blends with the hue of the withered herbage, the swiftness of their motion baffles the eye and they almost seem unsubstantial forms, driven like gossamer before the wind.

While they thus keep to the open plains and trust to their speed, they are safe; but they have a prurient curiosity that sometimes betrays them to their ruin. When they have scud for some distance and left their pursuer behind, they will suddenly stop and turn to gaze at the object of their alarm. If the pursuit is not followed up they will, after a time, yield to their inquisitive hankering, and return to the place from whence they have been frightened.

John Day, the veteran hunter already mentioned, displayed his experience and skill in entrapping one of these beautiful animals. Taking advantage of its well known curiosity, he laid down flat among the grass, and putting his hand-kerchief on the end of his ramrod, waved it gently in the air. This had the

effect of the fabled fascination of the rattlesnake. The antelope gazed at the mysterious object for some time at a distance, then approached timidly, pausing and reconnoitring with increased curiosity; moving round the point of attraction in a circle, but still drawing nearer and nearer, until, being within the range of the deadly rifle, he fell a victim to his curiosity.

In "Bonneville," Irving gives an interesting description of quite a different method of hunting as practiced by the Indians:

One day, the scouts, who had been ranging the hills, brought news of several large herds of antelopes in a small valley at no great distance. This produced a sensation among the Indians, for both tribes were in ragged condition, and sadly in want of those shirts made of the skin of the antelope. It was determined to have a "surround," as the mode of hunting that animal is called. Everything now assumed an air of mystic solemnity and importance. The chiefs prepared their medicines or charms, each according to his own method, or fancied inspiration, generally with the compound of certain simples; others consulted the entrails of animals which they had sacrificed, and thence drew favorable auguries. After much grave smoking and deliberating, it was at length proclaimed, that all who were able to lift a club, man, woman, or child, should muster for "the surround." When all had congregated, they moved in rude procession to the nearest point of the valley in question, and there halted. Another course of smoking and deliberating, of which the Indians are so fond, took place among the chiefs. Directions were then issued for the horsemen to make a circuit of about seven miles, so as to encompass the herd. When this was done, the whole mounted force dashed off, simultaneously, at full speed, shouting and yelling at the top of their voices. In a short space of time, the antelopes, started from their hiding places, came bounding from all points into the valley. The riders now gradually contracting their circle, brought them nearer and nearer to the spot where the senior chief, surrounded by the elders, male and female, was seated in supervision of the chase. The antelopes, nearly exhausted with fatigue and fright, and bewildered by perpetual whooping, made no effort to break through the ring of the hunters, but ran round in small circles, until man, woman, and child beat them down with bludgeons. Such is the nature of that species of antelope hunting, technically called "a surround."

Audubon on his famous trip up the Missouri River was intensely interested in the prong-horn and wrote:

Observe now a flock of these beautiful animals; they are not afraid of man—they pause in their rapid course to gaze on the hunter, and stand with heads erect, their ears as well as eyes directed toward him, and make a loud noise by stamping with their forefeet on the hard earth; but suddenly they become aware that he is no friend of theirs, and away they bound like a flock of frightened sheep—but far more swiftly, even the kids running with extraordinary speed by the side of their parents—and now they turn around a steep hill and disappear, then perhaps come in view, and once more stand and gaze at the intruder.

Judge Caton says:

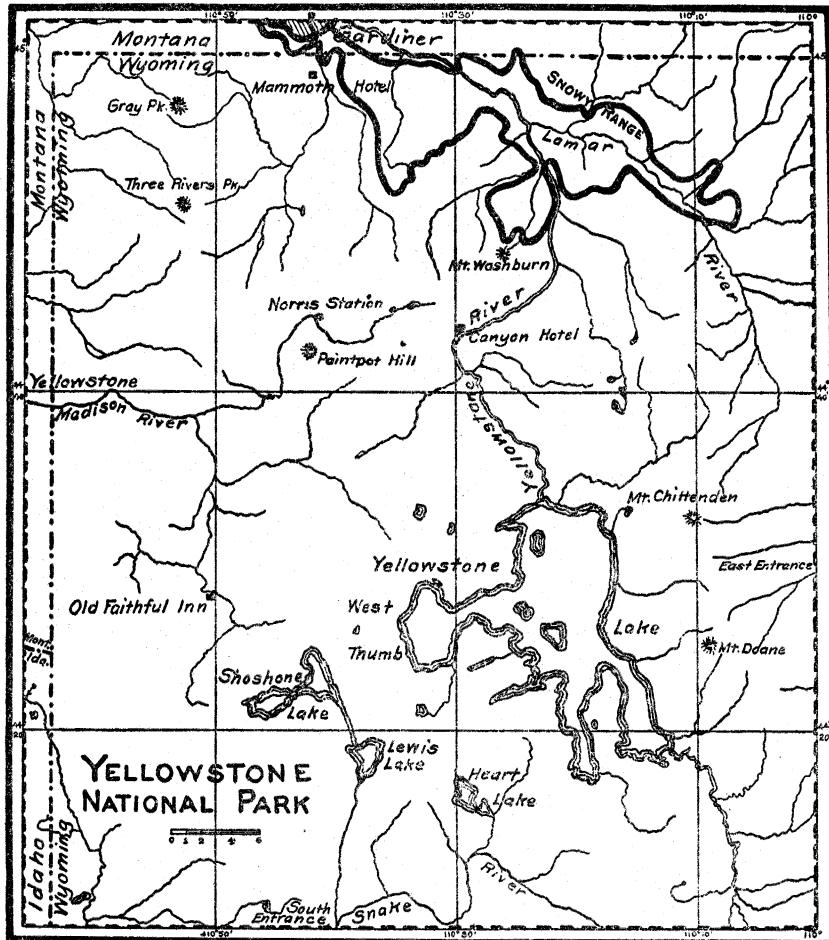
Our antelope was an essential article of food among the aborigines inhabiting the country which it frequented before the introduction of fire-arms among them. They had various modes of capturing it, chief among which was the bow and arrow. This mode involved the necessity of getting a very close range. This could be done only by some kind of artifice, or by the most skillful and cautious stalking, always remembering its defective eyesight, its acute senses of hearing and smelling, as well as its inordinate curiosity. The latter infirmity was taken advantage of by the savage, who, approaching the game as nearly as he safely could from behind the sage bushes or other concealing object, exhibiting in irregular motion a piece of the tanned skin of the animal, colored red or white, or some other attractive object, would attract the game. When the attention of the antelope is attracted by such an object alternately appearing and disappearing, its curiosity becomes excited and an interesting struggle commences between that and its timidity; it will approach cautiously, then retreat a little, then prance around, drawing towards the object gradually, till it is finally brought within bowshot. Then it was that the Indian would let fly his arrow from his concealment, or spring to his feet, the arrow to the string, and the bow partly drawn, and strike his victim before his fleetness could carry him beyond reach.

In former days the prong-horn ranged from central Iowa to the Pacific Coast and from the Saskatchewan River to the interior of Mexico, most generally on the open plains or in broad valleys. There is no record of it being east of the Mississippi in historic times, no bones found even in the old Indian mounds, and no traditions among any of the eastern Indians.

While the present range is smaller than that of the early nineteenth century by only a few hundred miles on the east and west, the former great abundance, computed to have been as great as that of the buffalo, has sadly dwindled until now probably less than three thousand head are all that remain. As an instance of this decrease let me cite a recent report from Colorado which says that, although there are a few prong-horns left in the eastern part of the state, there is only a lone one left of the thousands that used to roam in North Park. Dr. Edgar A. Mearns in "Mammals of the Mexican Boundary" has this to say of the southwestern form, *mexicana*:

The prong horn antelope is already [1907] a rare animal in the region of the Southwest, where it ranged in thousands twenty-five years ago. In much of the region covered by my field notes of the eighties no antelope can be found at the present day. The antelope was not uncommon from the Rio Grande to the Animas Valley during the operations of the International Boundary Commission, and antelope and deer were largely depended on for a supply of fresh meat. In 1884 great herds of them could be seen in crossing the Terri-

tories of New Mexico and Arizona by rail. Herds were frequent between Ash Fork and Whipple, along the stage route in March, 1884. At that time thousands of them were killed annually around the San Francisco and Bill Williams mountains, but none remained in the immediate vicinity of Fort Verde. About that time hunters began to comment upon its rapidly decreasing numbers throughout the region, and by the year 1888, it had become comparatively uncommon except in restricted areas still unoccupied by the whites.



DISTRIBUTION OF PRONG-HORN ANTELOPE IN YELLOWSTONE PARK

The dark line includes the antelope range, 100,000 acres.

The cross-lines indicate the winter range, 3,000 acres.

In the Yellowstone the range is restricted to the great open section in the north, comprising the Gardiner Valley, Mount Everts, Blacktail Deer Valley, the slopes on both sides of Hellroaring Creek, Junction Valley, the lower slopes of Mount Washburn on the north, the lower and upper valleys of the Lamar River, and Specimen Ridge. The whole area is below 6500 feet elevation except the table-land of Mount Everts, the upper parts of the Blacktail Deer Valley, the slopes of Mount Washburn (extending to 7300 feet), and Specimen Ridge (extending to 8000 feet above sea level). The total range includes about a hundred thousand acres out of the park's two and a quarter million acres. Of this habitat the summer range of ninety-seven thousand acres is ample, but the winter range of only three thousand acres is far too restricted, especially when snows cover the larger part of it. Forty years ago, limited numbers ranged the Swan Lake and Hayden Valleys, but such is no longer the case. Probably in former days, before white men began changing the environment, prong-horns were more numerous in the park in summer and less so in winter. That our herds have suffered a serious depletion is evidenced by the following estimates from the Superintendent's annual reports:

- 1877—"Thousands of antelope."
- 1880—"Abundance of antelope."
- 1885—"Several bands of antelope."
- 1886—"Antelope are here in large bands."
- 1887—"Large numbers of antelope."
- 1891—"Numerous, and on the increase."
- 1892—"Thriving and increasing."
- 1893—"One herd of four to five hundred wintered on Mt. Everts, and one or two smaller herds elsewhere."
- 1894—"500 wintered on Mt. Everts."
- 1895—"800 wintered on flat near Gardiner."
- 1896—"A great increase in number."
- 1897—"500 wintered in valley and on Mt. Everts."
- 1898—"Are yet numerous."
- 1899—"Not more than 700-800 in the park."
- 1900—"Increasing."
- 1902—"Number of bands of from 50 to 100 wintered on slopes of Mt. Everts."
- 1903—"1000 estimated."
- 1904—"1150."
- 1905—"1500."
- 1906—"1500."
- 1907—"1500."
- 1908—"2000."
- 1909—"Increasing."
- 1910—"600-700" (the balance reported to have escaped from the park).

- 1911—"450 counted."
- 1912—"500."
- 1913—"Increased slightly."
- 1914—"600 counted."
- 1918—"350."
- 1920—"300."

While the reports of the earlier years tell of thousands of prong-horns in the Yellowstone, it must be remembered that then there was nothing to prevent the animals from flocking up from the plains. Gamekeeper Young states in 1881 that "very few of the deer or antelope wintered anywhere in the park." A migration now to the plains would be slaughter, for if an antelope gets out of the park, it is gone as if swallowed up. The 1887 report is the earliest one mentioning that it was found necessary occasionally to drive the antelopes back from the boundary.

From 1872 to 1883 it is reported that antelopes were killed each year in the park "by the thousands." The Rules and Regulations of those days read: "All hunting, fishing, or trapping within the limits of the Park, except for purposes of recreation, or to supply food for visitors or actual residents, is strictly prohibited." And even these extremely wide-open rules were not enforced; it rather seems to have been the policy of the superintendents and their assistants to beg (!) the shooters to be moderate in their activities. With the incoming of the military regime in 1886, the rules (grown more stringent) were enforced, but there was no punishment provided for illegal hunting until 1894.

As a rule prong-horns confine themselves to the great open plains and the broader interior valleys of the mountains. They do not browse, the forest does not contain their food, and the great open ranges give their marvelous speed and matchless eyesight full scope to serve them. Still, like most rules, this has its exceptions. Frequently I find prong-horns in more or less open, stunted growth consisting of aspen, willows, or Douglas fir; often when surprised in restricted areas they show no hesitancy in entering timber to escape. Stranger still, it is reliably reported that in the southwest, prong-horns habitually lived in the open yellow pine forests of certain elevated sections.

Unless there is a scarcity of food, individuals of the antelope tribe remain within a small area of a few hundred acres. Usually they are to be found lying on some favored knoll, where they can see in all directions and can give their sense of smell full play to discover an enemy. In winter, the hilltops have the added attraction of being

swept clean of snow. Still, broad and level meadows are also favorite feeding grounds, especially on windy days.

When on migration, antelopes may travel a score or more of miles in a day. On the plains, in the old days, migration was the regular thing and well known to the hunters who frequented the spring and fall routes. Even here in the Yellowstone where the total migration is limited to thirty miles, three days is enough for these animals to travel from the winter range to the extreme limits of the summer habitat. The winter range is occupied until the latter part of February, when the large bands break up into smaller groups and the individuals show their uneasiness by keeping up near the receding snow-line; and, at the very first opportunity in early April, they break through the passes on Mount Everts and up the Yellowstone River to the summer ranges to the west. The day after they get through, they arrive on the southern slopes of the Hellroaring section, and two days later are in the upper Lamar Valley. During the migrations, it is a doe that leads the band, even though there may be several adult bucks present. But this rule is not invariable, for, about once in twenty cases, I find a male leading, especially if the band be small. Occasionally a mated pair make the migration together, for prong-horns are affectionate and much less quarrelsome than others of the large mammals. They remain throughout the summer on the higher ranges, and the first return movement becomes noticeable about September first when they move down from the heights of Specimen Ridge. As a rule the fall migration is a gradual one, the prong-horn population moving forward as a whole a mile or two a day with many halts, unless an early storm accelerates the movement. About the same time that the migration starts at the western end, the first migrants appear at the eastern end on the winter range. While the migrating prong-horns remain in pairs and small groups in September and early October (or the duration of the rutting season), they begin to gather in large bands soon after that. During October, all the antelopes leave the upper Lamar Valley, Junction Valley, and the Hellroaring Range. Some linger a few days on the forage ranges about Blacktail Deer Creek, and many stay during November on Mount Everts; but usually by December first all are on the lower ranges just across the park boundary from Gardiner, Montana, extending up the lower slopes of Mount Everts. To be sure this schedule is average; weather conditions may retard or accelerate the movement considerably at any stage. Even on the winter ranges temporary changes of weather cause the prong-horns to move up or down

as the snow-line changes and uncovers more or less ungrazed forage. In spite of their warm coats, these animals are susceptible to changes in temperature and are prone to seek shelter, especially from cold north winds. On the other hand, they do not seek shelter in summer from the blazing sunlight. In common with many other animals, they have some sense of foretelling weather changes and when we observe a certain nervousness and uneasiness in the prong-horn bands, we have learned to look confidently for a storm in a day or two.

As with all animals, there are erratic individuals in the antelope herds. A few stay all summer on the lower ranges, and one winter was notable for the successful stay of a small buck in the willows along the Lamar, where he subsisted on hay spread each day in the buffalo pasture at the Buffalo Ranch.

The migrating bands of the old days on the great plains numbered prong-horns by the thousands and those on the northern plains regularly moved south with the first fall of snow. But by the beginning of the twentieth century their numbers had fallen to such an extent, and the individuals had scattered so far, that large herds could gather no longer.

The prong-horn has a wonderful eyesight. As Geo. W. Wingate says, "the hunter must never assume that any antelope he sees, even with a glass, is not watching his movements." Not only is the eye large, but it is placed on the side of the head in a prominent place so that it indeed seems "that they can look out of the back of their heads." Personally I have had animals a half to three-quarters of a mile away see me the instant I moved an inch. Timid and suspicious as they are, they are liable to panic, and will dance up and down; but when once started they are very fleet for a short distance. Unless in good condition, they may then become fatigued. When going slowly, they walk or trot, at times making use of a gait consisting of a series of stiff-legged bounds; but when in a hurry, they run, hugging the ground closely and using every available ounce of strength to accomplish distance. So amazing is their speed, even faster than the deer's, that it is frequently said that "them antelope have sure stamped." With first-class greyhounds and good horses prong-horns can sometimes be run down, but without these dogs the best a good horseman can do is to get within two or three hundred yards. The average breed of dogs stand little chance, even when hunting in packs, for the antelopes usually run away from them. Prong-horns, when once started, are very loath to change their course so that it is often possible to dash quite close to them by darting ahead at an angle towards their line of

flight. They can make astonishing horizontal leaps, but are not high jumpers ordinarily.

Cutaneous glands and hair tufts are absent from the limbs, but occur at the base of each ear, behind the hocks, one on the lower back, one on each buttock, and one interdigital gland on each foot—eleven in all. But the lachrymal glands and sinus are absent, although often found in the Bovidae. The buttock glands and the dorsal gland are not found on any of the Bovidæ that I know of. When the rump hair is raised or lowered a strong, musky odor is given out, and it is suggested by Dr. R. W. Shufeldt that the office of these many glands is to furnish an odor to protect the animals from the swarms of insects such as gnats, mosquitoes, and flies.

Prong-horns do not seek to elude observation, all they care about is to be able to see for themselves. Their habit of lying on a commanding knoll to give full scope to keen eyesight has already been spoken of; but they often take the opposite course and lie in a hollow to get out of a breeze, which they do not seem to like. They also are apt to face towards the wind to give their ears and noses the very best opportunity to detect the approach of an enemy. While ordinarily the color is a conspicuous one, still it has some protective value. I remember once seeing a stone the same color as an antelope, but when I got opposite to it, to my great surprise a big buck antelope jumped up. And I often have the opposite experience and have a prong-horn turn out to be a stone on closer examination!

These animals can swim when necessary, often fording swift and deep streams (on one occasion I saw a spring flood dashing high over a swimming prong-horn, which, although swept downstream at considerable speed, kept bravely on and finally got across), but I do not see them standing in water as deer and elk do, nor do I often see them bathing. In fording a stream, they do not stop to drink as elk usually do; and I notice that in every case antelopes have left the water on the run and have gone quite a distance before even stopping to shake themselves. Perhaps they do not like to risk being between the high banks that most of our streams have.

In their eating, prong-horns confine themselves largely to various grasses, preferably those like the gramma, buffalo, and bunch grasses that cure well on the stalk. They are also fond of alfalfa and will strip the heads from any vagrant oat stalks they find; but they cannot live on the rich, green grasses of the East. I have never seen any evidence of browsing on bushes and trees, except that they eat leaves

from the *tridentata* sage quite freely, even when forage is plentiful. Their hours for feeding are irregular, but when they are feeding, prong-horns crop their food for about an hour, then lie down and "chew the cud" for thirty to forty minutes before resuming grazing. I have never seen antelopes paw away the snow, as do deer and elk, nor have I ever found any spots so uncovered by them. The ones I have watched preferred to hunt a bare spot, or selected a thinly covered space where they could push the snow aside with their noses. Prong-horns are dainty eaters, picking out only the cleanest and best of the grasses; and avoid all stretches already grazed by domestic animals, especially sheep. When forage is good, they become fat and strong, and the kids develop much faster than during lean years. I believe, too, that horn growth is stronger and better after a good summer and autumn season. Prong-horns are fond of "soda licks," and at times take some of the salt put out for the buffaloes; in winter they often eat snow in preference to hunting up the scarcer open water. When they do seek water, they are as apt to do so at noon as at any other time of the day.

It is rather difficult to be positive on such a point, but all my notes seem to show that prong-horns are quieter during the night and not given to moving about nor eating so much as in daytime. Certainly they are less nocturnal than deer and elk. Quite often they spend the nights on hills and elevations, and move down to the valleys to feed in the morning.

The rutting season is in September and October, at which time antelopes are found in pairs and small groups of three, four, and five, but I see no evidence of the "harem" habit of the elk, where the male gathers together as many of the other sex as he can. Courtship seems to consist largely in swift running matches wherein the doe runs away from the buck, or suffers herself to be caught, as she sees fit; for she evidently is the speedier of the two. I am inclined to rate this animal very high on the score of family associations. It is true that prong-horns combine in large bands during the winter months for mutual protection, but about the first of February they disband into couples and small groups. All through the spring and summer I find couples and small family parties, with the bucks living peaceably with their wives and families. At times the buck on a knoll often mounts guard over them to prevent surprise while they feed quietly below. But it often happens that two rival bucks are found fighting during the mating season, and I have seen a small buck driven out of a small

band of does and kids by a larger and stronger buck. Usually the contests do not develop into a battle; the weaker animal gives up after a pass or two and is chased off by the victor. Where a fight does develop the two bucks come together head on, then each strains hard to push his rival back. After a minute or two, one suddenly springs away, turns, and is off like a shot with the other in hot pursuit for a half mile or more. At other seasons they seem even more peaceable, and I can only attribute the fact that almost every shed horn found is marked with scars, to the fact that the sheath is comparatively soft and that they are shed so soon after the rut is over.

The period of gestation is a little over eight months or slightly longer than with deer. Late in May, or early in June, the doe retires to some secluded spot and there the kids are born, usually two at a time. Compared with deer and elk of the same age, a prong-horn baby is unusually strong and reliant. True it trusts largely to hiding to escape its enemies, but if necessary, it can run quite fast. If the mother has any chance at all to fight for her youngsters, she will attack at once and fight with great intrepidity. She uses her sharp hoofs with fine effectiveness, striking a quick, downward blow with her fore feet that easily disables a coyote or similar foe. There being no rattlesnakes in the Yellowstone, I cannot confirm of my own knowledge that she can cut one to pieces before he can strike, but I do believe it probable. That the young are efficient in their fight for existence is shown by the number that survive the first year. In the spring of 1921, I found by careful count that almost 19 per cent of our herd were young ones approaching one year old, this figure being much higher than for our other large animals. I remember well a little fellow found one fourth of June; I did not see his twin until later, and the mother, not at all. He was unseen until I almost stepped on him; when he ran, he started at once at full speed, and so astonishing was his speed he seemed fairly to fade from sight into the misty rain that was falling. He was somewhat lighter in color than the adults, and with markings nowhere near as distinct, but his coat served him well, protectively, among the gray glacial boulders of his native bench land. Later I found his brother in the lee of one of these same boulders. Judging from what I have seen, new-born kids are capable of withstanding quite severe cold spells, and storms of snow and hail.

Sometimes I find old bucks off by themselves; but there are enough exceptions, so that I would not feel safe in saying either that hermitage was usual for the old fellows, or that it was not. As I have said before,

family parties are frequently seen in summer, and in winter prong-horns certainly are social and gregarious, all our animals gathering together in one or two large bands. As far as other species are concerned, they evidently prefer to be by themselves. I see no evidence of antagonism, but an antelope's disposition seems to be to avoid all other animals. Occasionally they are with deer, elk, mountain sheep, and even buffaloes, but the association is due to limited forage and not at all to sociability. The prong-horns always shy off from the larger animals, do not relish their proximity, and even go so far as to decline forage over which elk and domestic sheep, cattle, or horses have grazed. Two or three times I have seen them running from pursuing buffaloes and elk.

In addition to being peaceable and friendly among themselves, many of the antelopes get strangely tame and confiding towards us. In riding horseback along our roads, I have passed within twenty feet without disturbing them in the least. Yet they vary a good deal, and individuals that I marked one day as tame, were met the next day on migration and were extremely nervous and wild. In fact, I have found prong-horns much wilder and more suspicious on migration than at other times.

Timid as they are, prong-horns have such a developed sense of curiosity, that it serves them ill against man; in the case of their natural enemies, their matchless speed will usually carry them out of any danger their curiosity gets them into. Since the days of Lewis and Clark, hunters, taking a leaf from the Indians' method, have made use of a red flag to entice the curious animals within range of their rifles. Nor is it necessarily red, any color will do, the more conspicuous the better. If no flag is convenient, the hunter lies on his back and kicks one foot quickly up and down. In fact any strange object, or any strange motion, will do the trick.

On one occasion a buck prong-horn on a river bottom saw two elk coming down a hill a mile away, ran to and around them, and then back to where he had been originally. On another occasion, I got off my horse and left him to graze while I examined a bird-nest I had discovered. Soon a female antelope came up over a hill and spied the horse; immediately she began to display great curiosity, circling about, and gradually working nearer, but frequently whirling as quick as a flash, and away at full speed for a hundred feet, only to draw nearer once more. When a vagrant eddy of wind carried a scent of me to her, she was off in earnest and ran clear out of sight; but even then after a short stay, she was back again for another look!

On another day on the main road, I had a small male antelope come up to within a hundred feet to watch me ride past. As I did so, he squealed and stamped first one fore foot and then the other, and then trotted up and crossed the road in front of my horse. On another occasion I approached a group of twelve animals standing on a knoll. Most of them moved off, leaving one that permitted me to pass within fifty feet. After I had passed he started suddenly to run and was almost instantly at full speed and seemed to grow more and more frightened the farther he ran.

Such occurrences are common enough almost daily; and when we are in camp on the prong-horn range, we so often have a single animal, or even a group of three or four, come up to inspect camp and stay about for some time, that it arouses little comment. Where blinds are built for photographic purposes, they usually result in attracting, sooner or later, most of the antelopes in the vicinity. My experience has been that single animals are more apt to show this inordinate curiosity, still I have had considerable bands come close to my blind at times.

Naturally the broad open plains on which the prong-horns live, and the fact that they depend more on eyesight and their sense of smell, make calls and sounds more or less superfluous and create the necessity for other signals. They have an alarm note that might be described as either a squeal or a bark, and they use it when curious as well as when alarmed. But one of the great characteristics of this animal is its "signalling" with its rump patch, whose dazzling white hairs can be erected or depressed at will. In times of excitement, alarm, and pain, these patches are erected, forming two "great chrysanthemum-like white rosettes," as Dr. E. W. Nelson expresses it, that instantly attract attention and can be seen for a long distance. The prong-horn, first giving the signal, turns so that all his companions can see it, sometimes it is constant and sometimes the alternate raising and lowering gives a quick series of flashes. A second animal seeing the signal, repeats and the alarm is flashed from point to point across the plains as if from a series of heliograph stations. Then all the animals run together into a small, compact band, if it is at all possible. As they dash away, the white signals can be seen for a long distance; as the animals halt and face about, the signals disappear and the otherwise neutral color causes the animals to fade out as by magic. But if there is still cause for alarm, the white signals flash out again and again long after the rest of the animal has become invisible. Upon investigation it is found that there is a mass of muscle underlying the buttock patches and glands

and all interconnected. As soon as the animal is excited these muscles act, perhaps involuntarily, the hairs are raised and the glands are exposed, releasing a musky odor noticeable to man's poor nose for quite a distance, especially down wind. No doubt the superior nose of an antelope can detect it a mile away on open ground. Has this animal, perhaps, a second odor meaning that the exciting cause is ended, or that it is not dangerous?

In captivity antelopes are trustful, affectionate, and fond of being noticed; very playful when young, their growing strength soon makes them too rough for human companionship although I have yet to hear of one that became actually vicious. They like to follow people about, but apparently never lose their extreme nervousness; even a dislodged pebble being sufficient to put them to flight in terror, although they soon come back again. At such times the youngster, that may never have seen an adult do it, will instinctively "flash" his signal. The usual run of dogs bother little even a very young antelope, which has no difficulty in outrunning a pack of them.

Unfortunately, prong-horns are very hard to keep in parks and zoological gardens, and indeed anywhere off the great, dry, open ranges that produced them. The superintendent of one of our zoological gardens writes me that out of thirty-two specimens only a few lived over one year, and that their best record was one that lived five years. I have heard of only two or three instances where young have been born in captivity and they did not live long in any case. Antelopes seem very susceptible to diseases and especially parasites of one kind or another. Their food must be carefully chosen for they do not live on a diet of rich green grass. A ration of rolled oats, clover, and a very little grass, with a little salt two or three times a week, has given the best results. But in addition to these difficulties, the great trouble seems to lie in the extreme timidity and nervousness that gives a captive so little rest and tranquility.

In common with other animals, their life on the broad open ranges keeps them comparatively free of diseases; practically all of their troubles of this kind being due to infection from domestic sheep, cattle, and horses.

Prong-horns in captivity suffer from pneumonia, malignant catarrh, pyemia, congestion of the lungs, and ulcers; most of these are climatic diseases and have not been serious among our Yellowstone animals. But with actinomycosis, or lumpy-jaw, the case is different. Some of our elk, deer, and antelopes have died from this disease; and in the

case of the last animal, the disease is particularly virulent, and few, if any, recover from an infection.

Internal parasites are of several kinds that infest domestic sheep, goats, and cattle—tape worms, stomach worms, whip worms, and hair worms. There is also a tape worm found in foxes, wolves, and coyotes, which in the embryo stage is found in our antelope.

External parasites that we must guard against are the wood tick and the scab mite; both of which are dangerous because of debilitating effect on the victim.

For approximately three months, from about the first of November, prong-horns gather together in large bands for mutual protection. This period corresponds with the growing season of the bucks' horns, when they are least able to defend themselves. It is interesting to observe that during these three months, the bands are led by the does although there may be several full-grown bucks present. More than once I have seen a band, when climbing a low elevation, stop before it reached the crest, permitting the leading doe to run up and look over to examine the country ahead for some minutes before she returned to lead the band up and over. Prong-horns are usually watchful enough to prevent the close approach of an enemy, for it is their rule to occupy good lookout positions, and they frequently have sentinels posted whose only duty is to watch while the rest feed.

Coyotes, especially when banded together in packs, are the most dangerous of the antelope's enemies. Even so, I do not believe they catch many of the healthy adults, although a few of the old and diseased animals fall victims. Undoubtedly the coyotes cause additional damage by worrying them, and keeping the nervous animals stirred up and excited. The gray, or timber, wolves kill a few antelopes, although as a rule they confine their attacks to larger and slower animals. Owing to the peculiar rough and broken character of our winter range, affording good lurking places, the mountain lions manage to kill a few under exceptionally favorable circumstances. I doubt if a bear can catch a prong-horn unless he finds a very young kid hiding. Buffaloes occasionally kill very small kids, but as a rule, even the youngest are speedy enough to escape. The only birds I can think of as possibly dangerous, are the great golden eagles; there I should say the danger was small because other game, during the extreme youth of the kids, would be easier to get.

It is extremely difficult to determine how long antelopes live. They reach maturity at five, and, as a rule, live from three to five years

longer, although at times an individual reaches the ripe old age of twelve or fifteen years.

Dr. R. W. Shufeldt tells of an unusual animal seen six miles north of old Fort Fetterman, in Wyoming. Of a band of nine antelope in a shallow valley

the largest buck, a full-grown and splendid specimen, had jet black head and shoulders, while the coloration of the rest of his body was normal. A case of melanism of an antelope—where the condition was confined to the head and shoulders—must certainly be one of the rarest occurrences in nature.

Although the great abundance of the antelope in the old days made sure an ample supply of meat for the use of the hunters, red and white, the quality of this meat, which is described by one authority as "delicious" and by another as "highly relished by everyone who has ever partaken of it," only served later to hasten the destruction of the animal. The secretion from the glands, although strong and musky, does not affect the flesh in any way. Until late in the 70's the Indians on the plains depended to no little extent on the antelope for meat, especially when deer, elk, and prairie-dogs could not be obtained.

Dr. E. W. Nelson says:

In 1884 antelope still existed in large numbers at many points in the Rocky Mountains from near the Mexican to the Canadian border. We killed antelope, deer, or elk for ranch use throughout the year without a thought that the supply was not perpetual.

And Col. Theodore Roosevelt has written, "On my ranch it has always been the animal which yielded us most of the fresh meat in the spring and summer."

I have already related how hunters, Indians as well as white men, made use of the antelope's great curiosity to lure them to destruction by waving a red shirt, a bit of colored cloth, or other unusual but plainly seen object. But the Indians had other methods of hunting. It is known that they sometimes surrounded a herd, driving it into the water where the game could be easily slaughtered with arrows. Some of the tribes who had plenty of horses in suitable country, sometimes ran antelopes down by using relays of riders previously posted about a small band. It must be admitted though, that this method was very unproductive of results, often requiring a day's hard work on the part of twenty Indians and horses to secure one or two hundred pounds of meat.

But there was another method much more productive, and used by widely separated tribes. In his *Snake Dance of the Moquis*, Capt. John G. Burke gives the following:

We passed, near the Hopi villages in northeast Arizona, close to an antelope "corral" of the Navahos. These are made of two converging lines of stone and brush. The Navaho warriors, mounting their fleetest ponies, will scour the country for miles, driving before them the luckless game, which after a while reaches the narrowest point of the corral and then falls a victim to the hunters in ambush. The Indians are careful not to kill all, but to allow a few to escape. This forbearance is partly based upon a desire to allow the game to reproduce, and is partly religious in character.

And in the Lewis and Clark report:

A camp of Mandans caught within two days one hundred goats [prong-horn] a short distance below us. Their mode of hunting them is to form a large strong pen or fold, from which a fence, made of bushes, gradually widens on each side: the animals are surrounded by the hunters, and gently driven towards this pen, in which they imperceptibly find themselves enclosed, and are then at the mercy of the hunters.

This same method was used in the upper Yellowstone country by the Crows and Blackfeet. Even now there is the remains of an old "corral" essentially as described, near Reese Creek, three miles north of the northern boundary, and another near Emigrant, Montana, thirty miles farther north.

Perhaps another reason for the destruction of these beautiful animals was that they could be hunted at all times of the day, even during the noon-day hours when it was almost useless to try for deer and elk. On the other hand, antelopes were not only shy and wary and hard to approach, but they were also hard to kill. Colonel Roosevelt has stated that it was astonishing how fast a wounded animal, even when a leg was broken, could run unless given a more crippling wound. Even after having fallen, antelopes have been known to get up, throw off the hunters that may have laid hands on them, and escape. In contrast to the desirability of the meat the hides, either dressed as fur or tanned into leather, were not highly valued.

BIBLIOGRAPHY

- AUDUBON AND BACHMAN, *Quadrupeds of North America*, II, pp. 193-205, 1851.
BAILEY, VERNON, *Old and New Horns of the Prong-horned Antelope*, *Journal of Mammalogy*, pp. 128-129, May, 1920.
CATON, J. D., *The Antelope and Deer of America*, pp. 21-65, 1877.



BUCK PRONG-HORNS, JANUARY 20, AT A TIME WHEN THE HORNS ARE ABOUT
HALF FORMED

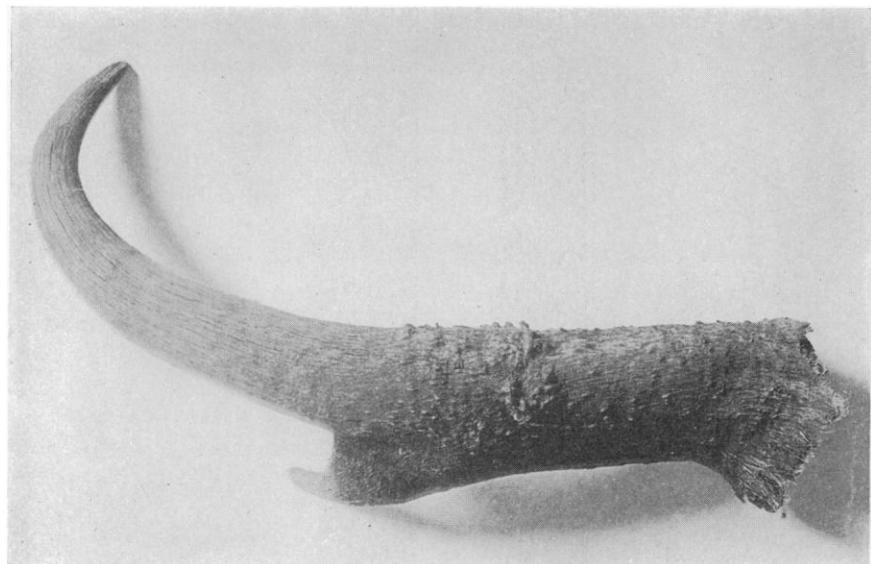
An examination will show the hard upper half, with the bristly hairs extending up from below. The lower picture shows the standing buck with "signal" raised.

(Skinner: The Prong-horn)



SHED HORNS FROM A THREE YEAR OLD AND A FIVE YEAR OLD BUCK

Both show the short curly hairs at base. The smaller horn also shows the start of two additional prongs below the main prong.



PRONG-HORN SHEATH, JUST SHED

Note the short white hair curling up from base. The roughness between base and prong is probably due to injury when fighting.

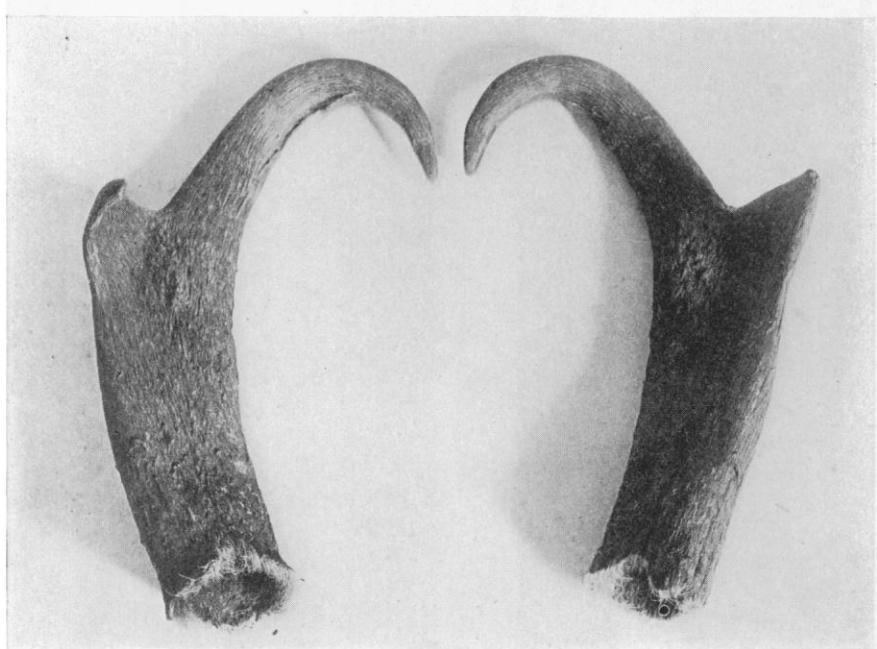
(Skinner: The Prong-horn)



SHED HORNS SHOWING PROGRESS OF DESTRUCTION

The horn on left was freshly shed; the next had been shed about five months; the next about seventeen months; and the one at extreme right also seventeen months, but had fallen in a place suitable to more rapid destruction.

(Skinner: The Prong-horn)



THE ONLY TRUE PAIR OF SHED HORNS FOUND BY AUTHOR

The injuries inside both tips are typical fighting scars. In the lower figure the horns are turned to show the natural front view.

(Skinner: The Prong-horn)

- COMMITTEE OF BOONE AND CROCKETT CLUB. Size of horns in Hunting in Many Lands, *The Book of the Boone and Crocket Club*, pp. 429, 1895.
- GRINNELL, GEO. BIRD, *Shed Horns of the American Antelope*, *Journal of Mammalogy*, p. 116, May, 1921.
- HORNADAY, W. T., *The American Natural History*, p. 116-118, 1906.
- JONES, E. LESTER, *Future of the Antelope*, *Proc. of the National Parks Conference*, pp. 205-207, Jan. 2-6, 1917.
- LEWIS AND CLARK, under date of Sept. 6 and 17, 1804.
- LYDEKKER, R., *The Great and Small Game of Europe, Western and Northern Asia, and America*, pp. 333-338, 1901.
- LYON, M. W., *Remarks on the Horns and on the Systematic Position of the American Antelope*, *Proc. U. S. National Museum*, XXXIV, pp. 393-399, 1908.
- MEARNS, EDGAR A., M.D., *Family Antilocapridæ, Mammals of the Mexican Boundary of the United States*, *U. S. National Museum Bulletin* 56, pp. 220-232, 1907.
- NELSON, E. W., *The Larger North American Mammals*, *National Geographic Magazine*, pp. 452-453, November, 1916.
- NELSON, E. W., in *Proc. of the National Parks Conference*, p. 201, Jan. 2-6, 1917.
- ROOSEVELT, THEODORE, *Trail and Camp Fire*, *The Book of the Boone and Crockett Club*, pp. 204-211, 1897.
- ROOSEVELT, THEODORE, *American Big Game Hunting*, *The Book of the Boone and Crockett Club*, pp. 129-132, 1901.
- ROOSEVELT, THEODORE, *The Deer Family*, pp. 98-130, 1902.
- SETON, E. T., *Life Histories of Northern Animals*, I, pp. 209-246, 1909.
- SHUFELDT, R. W., *The American Antelope*. *American Forestry*. Pp. 745-754, Dec., 1920.
- STONE AND CRAM, *American Animals*, pp. 54-57, 1905.
- WHEELER, OLIN D., *The Trail of Lewis and Clark*, I, p. 177, 1904.
- WINGATE, GEORGE W., *Through the Yellowstone Park on Horseback*, pp. 211-213, 1886.
- See also:
- IRVING, WASHINGTON, *Astoria*, II, pp. 18-20, London, 1836.
- IRVING, WASHINGTON, *Bonneville*, pp. 471-472, New York, 1869.
- Yellowstone National Park, Wyoming.*